

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9611

Roll No.

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B.Tech.

(SEM. II) EVEN THEORY EXAMINATION 2012-13

ENGINEERING PHYSICS-II*Time : 2 Hours**Total Marks : 50***SECTION-A**

1. Attempt **all** parts. All parts carry equal marks. Write answer of each Part in short : (2×5=10)
 - (a) Compare the wavelength of a photon and an electron if the two have same momentum.
 - (b) Why Compton effect is not observable for visible light ?
 - (c) Define Curie temperature for a ferroelectric material.
 - (d) What is skin depth ?
 - (e) Write the name of different types of single walled nanotube.

SECTION-B

2. Attempt any **three** parts. All parts carry equal marks : (5×3=15)
 - (a) A proton is moving with a speed of 2×10^8 m/s. Find the wavelength of the matter wave associated with it.

- (b) A beam of γ -radiation having photon energy 510 keV is incident on a foil of aluminium. Calculate the wavelength of the radiation at 90° and also the kinetic energy of the emission of the corresponding electron.
- (c) Find the polarization P in a homogeneous and isotropic dielectric material of relative permeability 4, when the electric displacement density $D = 2 \times 10^{-8} \text{ C/m}^2$.
- (d) The sun light strikes the upper atmosphere of earth with energy flux 1400 Watt/m^2 . Calculate the peak values of electric and magnetic fields at the points.
- (e) A super conductor material has critical temperature of 4.2 K in zero magnetic field and a critical field of 0.0305 T at 0 K. Find the critical field at 2.1 K.

SECTION-C

Attempt all questions of this Section. All questions carry equal marks :

3. Attempt any one part of the following : (1×5=5)
- (a) What are matter waves ? Derive an expression for de-Broglie wavelength of helium atom having energy at temperature T K.
- (b) Deduce a relation between phase velocity and group velocity in a medium where wave velocity is frequency dependent. What happens if the phase velocity is independent of frequency ?

4. Attempt any one part of the following : (1×5=5)
- (a) Derive time independent Schrödinger wave equation for a particle wave. What would happen to equation if particle is free ?
- (b) What is Compton effect ? Show that shift depends on the scattering angle.
5. Attempt any one part of the following : (1×5=5)
- (a) What is molecular Polarisability ? Explain electronic Polarisability.
- (b) What are ultrasonic waves ? Explain piezoelectric method to produce ultrasonic waves.
6. Attempt any one part of the following : (1×5=5)
- (a) What do you understand by displacement current ? Why and how Maxwell modified Amperes law ?
- (b) Derive Poynting theorem and explain its physical significance.
7. Attempt any one part of the following : (1×5=5)
- (a) What are superconductors ? Describe Meissner effect in superconductor.
- (b) What is nanotechnology ? Give some important applications of nanotechnology.

Physical constants :

Speed of light	$c = 3.0 \times 10^8 \text{ m/s}$
Planck's constant	$h = 6.62 \times 10^{-34} \text{ J-s}$
Mass of electron	$m = 9.1 \times 10^{-31} \text{ Kg}$
Mass of proton	$m_p = 1.67 \times 10^{-27} \text{ Kg}$
Permeability	$\mu_0 = 4 \pi \times 10^{-7} \text{ H/m}$
Permittivity	$\epsilon_0 = 8.854 \times 10^{-12} \text{ F/M}$